Calc β, BRIDGE 2018 **Name:** ____________________________

Homework #17: Integration via substitution

Note: Your work can only be assessed if it is legible.

1. Evaluate each of the following indefinite integrals using substitution, expressing your final answer in terms of x.

   (a) $\int (2x+1)e^{x^2+x+7}\,dx$

   (b) $\int \frac{x^3}{1-x^4}\,dx$

   (c) $\int \frac{\sin(\ln x)}{x}\,dx$

   (d) $\int \frac{3}{x\ln x}\,dx$

(e) $\int e^{-x}\, dx$

(f) $\int \frac{\cos x}{e^{\sin x}}\, dx$

2. Rewrite each of the following definite integrals in x as a definite integral in the indicated variable u. Do not evaluate the new definite integral.

   (a) $\int_0^1 x^2(1+2x^3)^5\, dx$ in terms of $u = 1 + 2x^3$.

   (b) $\int_0^{\pi/3} \frac{\sin x}{\cos^2 x}\, dx$ in terms of $u = \cos x$.

(c) $\int_2^3 xe^{-x^2}\,dx$ in terms of $u = x^2$.

3. T/F (with justification) If $u = \sqrt{x}$, then $\int_0^4 f(\sqrt{x})\,dx = \int_0^2 2uf(u)\,du$.

4. Evaluate each of the following indefinite integrals using substitution, expressing your final answer in terms of x.

   (a) $\int x^5\sqrt{1+x^2}\,dx$

(b) $\displaystyle\int (x+3)(x-1)^5\,dx$

(c) $\displaystyle\int \frac{x}{x+1}\,dx$

(d) $\displaystyle\int \sec x\,dx$ *Hint:* Rewrite $\sec x \cdot 1 = \sec x \cdot \dfrac{\sec x + \tan x}{\sec x + \tan x}$.